

***** ABSTRACT ONLY *****

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THERMAL ENVIRONMENTS OF STRUCTURAL FIRE FIGHTING AND THERMAL TESTS FOR FIREFIGHTERS' PROTECTIVE CLOTHING

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Fire loads have significantly increased in homes and businesses since the 1940's. In addition, heat release rates of furnishings and contents have also experienced significant increases. Building construction has produced more highly insulated structures with greater amounts of thermal insulation. All of these factors have affected the way that fire grows in structures, and it has added new challenges for the fire service. With these new fire challenges, there have also been significant improvements in firefighters' protective clothing and equipment. The SCBA (Self-Contained Breathing Apparatus) has become a standard piece of protective equipment. Firefighters' protective clothing provides greater protection from the intense thermal environments of structural fire fighting. Even though there have been significant improvements in firefighters' protective clothing and equipment, the burn injury rate has remained relatively constant for more than a decade. This apparent paradox, to some degree, is the result of the fire service pressing fire attacks to the performance limits of their protective clothing and equipment. Today's firefighters' protective clothing is primarily designed to protect a firefighter from a short duration flash fire, and few of the other levels of thermal exposure have been addressed. Test methods in standards for the performance of firefighters' protective clothing generally focus on the flash fire environment because of its serious nature. This focus has left many firefighters with the impression that if their protective clothing can protect them from a flash fire, it will also protect them from all other thermal exposures of structural fire fighting. Statistics show that the majority of burn injuries are occurring from thermal environments that are not associated with a flash fire exposure. In addition to flash fires, firefighters are being burned from thermal radiation exposures, contact with hot surfaces or liquids and long duration flame contact.

This paper discusses the related factors of structural fire fighting thermal environments, causes of firefighter burn injuries and thermal performance testing of firefighters' protective clothing.